

REMARKS/ARGUMENTS

Claims 4 and 10 are cancelled.

Amended Claim 1 is supported, for example, at now cancelled Claim 4, the features of which, excepting thiocarbonyldiimidazole, are incorporated into Claim 1. Amended Claim 2 is supported, for example, at previously presented Claims 1 and 2.

No new matter is added.

**The anticipation rejection of Claims 1, 3, 5, 8-9, 11, and 19-21 as being unpatentable in view of Rannard I (Non-Patent Literature Publication) is traversed.**

Now cancelled Claim 4 was not rejected as being anticipated by Rannard I. The features of now cancelled Claim 4, excepting thiocarbonyldiimidazole, are incorporated into Claim 1. Accordingly, Applicants submit Claim 1 and the claims depending therefrom are not anticipated by Rannard I. Withdrawal of the anticipation rejection is requested.

**The anticipation rejection of Claims 1, 3-6, 9, 11-12 and 18-21 as being unpatentable in view of Rannard II (GB 2 324 797) is traversed.** Present Claim 1 is drawn to a process for preparing a functionalized, branched polyurea. In the process, the functionalized, branched polyurea is prepared by reacting at least one urea, at least one thiourea, or a combination thereof with at least one amine having at least three primary and/or secondary amino groups, and optionally, at least one amine having at least two primary and/or secondary amino groups, to form the functionalized, branched polyurea. The at least one urea, thiourea, or a combination thereof is selected from the group consisting of urea, thiourea, ethyleneurea, 1,2-propyleneurea, 1,3-propyleneurea, N,N'-diphenylurea, N,N'-ditolylurea, N,N'-dinaphthylurea, N-methyl-N'-phenylurea, N-ethyl-N'-phenylurea, N,N'-dibenzylurea, N,N'-dimethylurea, N,N'-diethylurea, N,N'-dipropylurea, N,N'-dibutylurea, N,N'-diisobutylurea, N,N'-dipentylurea, N,N'-dihexylurea, N,N'-diheptylurea, N,N'-dioctylurea, N,N'-didecylurea, N,N'-didodecylurea, carbonylbiscaprolactam,

ethylenethiourea, propylenethiourea, N-methylthiourea, N-ethylthiourea, N-propylthiourea, N-butylthiourea, N-phenylthiourea, N-benzylthiourea, N,N'-dimethylthiourea, N,N'-diethylthiourea, N,N'-dipropylthiourea, N,N'-dibutylthiourea, N,N,N',N'-tetramethylthiourea, N,N,N',N'-tetraethylthiourea, thiocarbonylbiscaprolactam, and combinations thereof.

Rannard II is drawn to “[h]yperbranched polymers containing linkages selected from urea, urethane, carbonate, ester and amine...” (see the Abstract of Rannard II). At page 4, line 21, Rannard II describes employing “carbonyl diimidazole” and “thiocarbonyl diimidazole” as reactants for forming the hyperbranched polymers. The Office, at page 3, paragraph 12, of the Official Action, describes in part “[r]egarding claims 1 and 9: Rannard et al., teach functionalized, branched, polyurea that is produced by reacting carbonyl diimidazole (CDI) with tri-functional polymamine...” and that “[i]t should be noted that CDI has a urea structure.” At page 4, paragraph 15, of the Official Action describes Rannard II as employing the urea “thiocarbonyldiimidazole.” Thus, the Office relies upon Rannard II to provide hyperbranched polymers by use of carbonyl diimidazole or thiocarbonyl diimidazole as reactants.

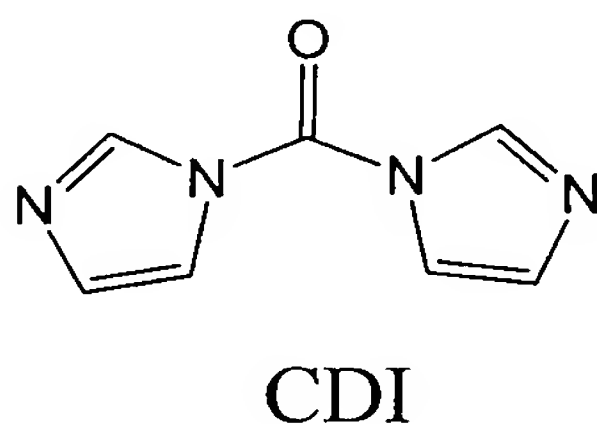
In present Claim 1 and the claims therefrom, as described *supra*, none of the at least one urea, thiourea, or a combination thereof is carbonyl diimidazole or thiocarbonyl diimidazole.” Accordingly, Rannard II does not describe or suggest the at least one urea, thiourea, or a combination thereof feature of present Claim 1 and the claims depending therefrom. Rannard II cannot, therefore, anticipate present Claim 1 and the claims depending therefrom. Withdrawal of the anticipation rejection is requested.

**The obviousness rejection of Claim 16 as being unpatentable in view of Rannard II is traversed.** Present Claim 16 depends, indirectly, from present Claim 1. As described, *supra*, Rannard II does not describe or suggest at least the “at least one urea, thiourea, or

combination thereof” feature of present Claim 1. Accordingly, Rannard II cannot render obvious present Claim 1 and indirectly dependent Claim 16. Withdrawal of the obviousness rejection is requested on this basis alone.

Additionally, Applicants have submitted, along with this paper, a Wikipedia Article on Carbonyldiimidazole (the CDI Article), a Wikipedia Article on Imidazole (the IMD Article) and a reference having W. James Feast as first author (the Feast Reference).

The Office, as described *supra*, has argued that carbonyldiimidazole (CDI) is a urea, which implies that CDI has a reactivity that is representative of ureas in general. This reasoning is unsupported by, and is in fact contradicted by, evidence and generally accepted chemical theory. The single imidazole resonance structure in Rannard II (see for example Formula (I) at page 3 of Rannard II), extended to CDI, is shown in the CDI structure below:



As described in the IMD Article, imidazole has at least 5 different resonance structures, and is classified as aromatic “due to the presence of a sextet of  $\pi$ -electrons.” Thus, the two free pairs of electrons, ostensibly present the two imidazole nitrogen atoms that are sigma bonded to the carbonyl in CDI, *supra*, are an artifact of inaccurately depicting and giving inordinate weight to a single imidazole resonance structure. In fact, these electrons are, as described in the IMD article, mostly localized in the aromatic 6  $\pi$ - electron systems of the imidazole aromatic rings. This delocalization results in a very high reactivity for CDI, which is atypical for ureas (emphasis added). Indeed, the CDI Article describes that “[t]he reactivity of CDI is similar to that of acid chlorides...” and “CDI is an equivalent of phosgene.” (See

also the Feast Article, that describes, in the Introduction, that CDI is “an analogue of phosgene...).” Ureas, as a genus, are not “analogs of phosgene” and do not have “a reactivity that is similar to that of acid chlorides.”

Accordingly, one of ordinary skill in the art would not be motivated to substitute the phosgene equivalent CDI, or the highly reactive thiocarbonyldiimidazole, both reactants of Rannard II, with the significantly less reactive urea, thiourea, or combination thereof as described in the Markush group of present Claim 1 (and indirectly dependent Claim 16) because doing so would be expected to either produce no product or significantly decrease the amount of product produced while significantly increasing reaction time. Withdrawal of the obviousness rejection is requested.

**The obviousness rejection of Claims 2, 4, 7-8, 15 and 17 as being unpatentable in view of Rannard II and Osterloh is traversed.** The rejection of Claim 4 is mooted by cancellation of Claim 4. Claims 2, 7-8, 15 and 17 depend, either directly or indirectly, from present Claim 1. As described, *supra*, Rannard II does not describe or suggest the urea, thiourea, or combination thereof as described in the Markush group of present Claim 1; and, one of ordinary skill in the art would not be motivated to substitute the phosgene equivalent CDI, or the highly reactive thiocarbonyldiimidazole, both reactants of Rannard II, with the significantly less reactive urea, thiourea, or combination thereof as described in the Markush group of present Claim 1 and the claims depending therefrom. Osterloh, whom the Office relies upon to provide a “diamine” (see page 6, paragraph 29, of the Official Action), does not cure the deficiencies of Rannard II. Withdrawal of the obviousness rejection is requested.

**The obviousness rejection of Claims 12, 15, 17 and 21 as being unpatentable in view of Rannard II and Rannard I is traversed.** Claims 12, 15, 17 and 21 depend, either

directly or indirectly, from present Claim 1. As described, *supra*, Rannard II does not describe or suggest the urea, thiourea, or combination thereof as described in the Markush group of present Claim 1; and, one of ordinary skill in the art would not be motivated to substitute the phosgene equivalent CDI, or the highly reactive thiocarbonyldiimidazole, both reactants of Rannard II, with the significantly less reactive urea, thiourea, or combination thereof as described in the Markush group of present Claim 1 and the claims depending therefrom. Rannard I, whom the Office relies upon to provide a heating a reaction system to “60°C” (see page 6, paragraph 29, of the Official Action), does not cure the deficiencies of Rannard II. Withdrawal of the obviousness rejection is requested.

**The obviousness rejection of Claim 13 as being unpatentable in view of Rannard II, Rannard I, and Osterloh is traversed.**


Present Claim 13 depends, indirectly, from Claim 1. As described, *supra*, Rannard II does not describe or suggest the urea, thiourea, or combination thereof as described in the Markush group of present Claim 1; and, one of ordinary skill in the art would not be motivated to substitute the phosgene equivalent CDI, or the highly reactive thiocarbonyldiimidazole, both reactants of Rannard II, with the significantly less reactive urea, thiourea, or combination thereof as described in the Markush group of present Claim 1 and the claims depending therefrom. Rannard I, whom the Office relies upon to provide a heating a reaction system to “60°C” (see page 6, paragraph 29, of the Official Action), does not cure the deficiencies of Rannard II. Osterloh, whom the Office relies upon to provide “dibutyltin dilaurate” (see page 8, paragraph 41, of the Official Action), does not remedy the deficiencies of Rannard I and Rannard II. Withdrawal of the obviousness rejection is requested.

**The obviousness rejection of Claims 13 and 14 as being unpatentable in view of Rannard II, Rannard I, and D'Aletio is traversed.** Claims 13 and 14 depend, indirectly, from present Claim 1. As described, *supra*, Rannard II does not describe or suggest the urea, thiourea, or combination thereof as described in the Markush group of present Claim 1; and, one of ordinary skill in the art would not be motivated to substitute the phosgene equivalent CDI, or the highly reactive thiocarbonyldiimidazole, both reactants of Rannard II, with the significantly less reactive urea, thiourea, or combination thereof as described in the Markush group of present Claim 1 and the claims depending therefrom. Rannard I, whom the Office relies upon to provide a heating a reaction system to "60°C" (see page 6, paragraph 29, of the Official Action), does not cure the deficiencies of Rannard II. D'Aleito, whom the Office relies upon to provide "potassium carbonate" (see page 9, paragraph 44, of the Official Action), does not remedy the deficiencies of Rannard I and Rannard II. Withdrawal of the obviousness rejection is requested.

Applicants submit the present application is now in condition for allowance. Early notification to this effect is earnestly solicited.

Respectfully submitted,

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